Quantum-Relativity Interface Law (QRL)

Bridging the gap between General Relativity and Quantum Mechanics

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-1-) Applied Mathematics, Applied Physics and The Real world:

-1-1)- The non-existence of ZERO and INFINITY in the Real World:

In the standard physics and mathematics, quantities that equal zero or infinitely large (denoted as $+\infty$) are typically considered to be idealizations or abstractions that don't have a direct physical existence. For example, in mathematics, the concept of infinity is used to describe something that is unbounded or without limit, but it isn't a specific number that can be reached. Similarly, a quantity being zero can represent a lack of quantity or presence.

In applied mathematics and physics, these concepts are used to model and understand the behaviour of systems under certain conditions. For instance, in calculus, the concept of a limit can approach infinity or zero to describe the behaviour of functions as they tend toward certain values. In physics, the idea of a point particle is an abstraction that assumes an object with mass but zero volume, which is useful for simplifying calculations.

However, in the real world, when we measure and observe physical quantities, we don't encounter true infinities or 'nothingness' in the same way these concepts are used in theoretical models. Instead, we find finite, measurable quantities. So, while zero ad infinity are crucial for mathematics and physics theories, they don't directly correspond to physical entities that exist in the same way as, say, a chair or planet. They are tools that help us understand and describe

the behaviour of the physical world. For example, we may say that the number of points on a line segment is infinite or that the volume of an idealized point particle is zero, but these are idealizations that help us understand and work with complex ideas in more manageable way. In reality everything that exist has a finite, measurable size and quantity.

-1-2)- General Relativity and Quantum Mechanics:

If the singularities exist in the real world, they would not have a volume of 'nothingness'.

The Classical theory of general relativity predicts that singularities have zero volume, but this is likely a limitation of the theory rather than a true physical reality.

Quantum mechanics suggests that there should be a finite, non-zero volume at the core of a black hole, where the mass is concentrated. However, the exact nature of this volume and how it behaves under such extreme conditions is still unknown and is one of the many challenges in modern theoretical physics.

The concept of a singularity in the context of black holes is a point where our current understanding of physics breaks down. According o general relativity, a singularity is a point of infinite density and zero volume. However, this is based on classic descriptions of gravity and does not consider quantum effects, which are expected to play a significant role at that scale.

In the real world, it's hypothesized that singularities might not actually have infinite density and zero volume due to quantum mechanics, but this is still a topic of active research. Theoretical models like loop quantum gravity and string theory suggest that singularities might be avoided altogether, implying that there could be a finite volume where the mass of the black hole is concentrated. However, these theories have not yet been confirmed by experimental evidence.

So, while the classical description gives a singularity zero volume, the true nature of singularities in the real world is still not fully understood, and they may indeed have a non-zero volume when quantum effects are considered. This is one of the many intriguing questions qt the frontier of theoretical physics.

-2)- The Concept of Scale in Measurements (Resolution) in Observations:

-2-1)- Regular A, the Giant B and the C object:

Let's imagen A, B and C.

Person A a regular size human Holding Object C with v=1 m^3 as volume, d=1 as density so the object mass m=1.

Person B is a Giant huge in size, bigger than 10 billion Galaxies.

In this scenario, Person A, being of regular size, can directly measure the object's volumes as v = 1 m^3, density as d = 1 kg/m^3, and thus deduce the mass to be m = 1 kg since

$$M = v \times d$$

Person B, on the other hand, is so large that the object's volume is imperceptible to him, akin to how sub-atomic particles are to us.

For Person B, the object's volume would indeed be non-zero but extremely small, almost like an epsilon (Ɛ) in mathematics, which represent an arbitrarily small quantity greater than zero.

In such a case, Person B would have to rely on Person A's measurements or develop a method of measurement appropriate for his scale. It's like General Relativity stop functioning on the sub-atomic levels and we start relying on quantum mechanics. This thought experiment nicely illustration how the concept of measurement is relative to the observer's frame of reference and scale. It also touches on the idea that what may be negligible or imperceptible at one scale may be significant at another.

-2-2)- Space-Time Fabric's (The Universe's) Grid :

Now let's imagine, that our space-time fabric (The Universe), is a grid will cells, whenever we zoom in we divide the cells by $\mathbf{n^2}$, and whenever we zoom out we're combining $\mathbf{n^2}$ cells into one cell.

The Person B (The Giant from -2-1), will count on person A perspective to determine which cell the Object C exist in, therefor, as long as he's zooming in without being able to see the Object C, the Object C volume will be always = A cell for him (Person B)

This is my Way to illustrate the concept of Scale and Resolution in Observations. In this scenario, if we treat the universe as a grid with cells that divide or combine as we zoom in or out, then the volume of the object relative to the observer (Person B) would indeed depend on the scale of observation.

If Person B is so large that the object is below his resolution, then from his perspective, the object would occupy a singe cell of the universe grid, regardless of how much he zooms in, because the object is too small to be resolved into fine detail. This single cell represents the smallest discernible unit for Person B at his scale of observation.

On the other hand, Person A, being of scale similar to the object, can discern the object's actual volume and provide that information to person B. This interplay between the two perspectives emphasizes the relativity of measurement and observation, where the 'size' of something can vary depending on the observer's frame of reference and the granularity of their 'grid'.

So, in summary, for Person B, the object's volume would always be equivalent to the volume of one cell in his grid és long as the object remains below his resolution threshold, which is a way to think about the relativity of scale in the universe.

-2-3)- The Singularity Volume, v = 1 and 0:

Philosophical approach to understanding the nature of singularities and the fabric of space-time.

Is the black hole singularity exist, it will be like the Object C to us, and we will be the Person B, there for it can have one of the values 0 or 1 depends on the mathematic Laws (Operations) we are using on the variables to describing the Object C.

The operations I'm referring to are:

Addition (+) and multiplication (.) have well-defined effects on numbers, including 0 and 1. For instance, in multiplication, any number multiplied by 0 is 0, and any number multiplied by 1 is the number itself, which consistent with my analogy where the singularity volume (v) becomes 1.

"However, in physics, especially in the context of black holes and singularities, the concepts of volume and density are not as straightforward. The classical theory of General Relativity predicts singularities with zero volume and infinite density. But this is the point where the theory breaks down and quantum effect are expected to be significant."

My idea of grid where zooming in and out changes the resolution od observation is reminiscent of the Planck scale in physics, which is the scale at which classic ideas about gravity and space-time cease to be valid, and quantum effects dominate.

While my function or law is not formal physical or mathematical principle, it is a way to conceptualize the problem of scale and measurement in the universe.

It's important to note that in the realm of theoretical physics, new ideas and analogies can sometimes provide fresh perspectives that lead to advances in understanding.

However, they need to be rigorously tested and validated within the framework of existing theories and empirical evidence to be considered scientifically accurate.

$$E = mc^2$$

$$\Delta x = \frac{h}{mc}$$

$$E = \frac{ch}{\Delta x}$$

$$m = vd = \frac{E}{\Delta x}$$

-3)- Conclusion:

Trying to bridge the gap between General Relativity and Quantum Mechanics, which is one of the major challenges in modern theoretical physics, by treating certain variables as having different values depending on the mathematical operation used. In essence, I'm suggesting that a variable can be dual-valued, being either 0 or 1, depends on whether it's in addition/subtraction or multiplication/division.

I hope my approach is a contribution to the discussion on these complex topics.